

Basics of the Immune System

Let's start at the beginning. What does it mean when someone says "I feel sick today?" What is a disease? By understanding the different kinds of diseases it is possible to see what types of disease the immune system helps you handle.

When you "get sick", your body is not able to work properly or at its full potential. There are many different ways for you to get sick -- here are some of them:

- **Mechanical damage** - If you break a bone or tear a ligament you will be "sick" (your body will not be able to perform at its full potential). The cause of the problem is something that is easy to understand and visible.
- **Vitamin or mineral deficiency** - If you do not get enough vitamin D your body is not able to metabolize calcium properly and you get a disease known as rickets. People with rickets have weak bones (they break easily) and deformities because the bones do not grow properly. If you do not get enough vitamin C you get scurvy, which causes swollen and bleeding gums, swollen joints and bruising. If you do not get enough iron you get anemia, and so on.
- **Organ degradation** - In some cases an organ is damaged or weakened. For example, one form of "heart disease" is caused by obstructions in the blood vessels leading to the heart muscle, so that the heart does not get enough blood. One form of "liver disease", known as Cirrhosis, is caused by damage to liver cells (drinking too much alcohol is one cause).
- **Genetic disease** - A genetic disease is caused by a coding error in the DNA. The coding error causes too much or too little of certain proteins to be made, and that causes problems at the cellular level. For example, albinism is caused by a lack of an enzyme called tyrosinase. That missing enzyme means that the body cannot manufacture melanin, the natural pigment that causes hair color, eye color and tanning. Because of the lack of melanin, people with this genetic problem are extremely sensitive to the UV rays in sunlight.
- **Cancer** - Occasionally a cell will change in a way that causes it to reproduce uncontrollably. For example, when cells in the skin called melanocytes are damaged by ultraviolet radiation in sunlight they change in a characteristic way into a cancerous form of cell. The visible cancer that appears as a tumor on the skin is called melanoma. (See [How Sun Tans](#)

and [Sunburns Work](#) for more information.)

When a virus or bacteria (also known generically as a germ) invades your body and reproduces, it normally causes problems. Generally the germ's presence produces some side effect that makes you sick. For example, the strep throat bacteria (*Streptococcus*) releases a toxin that causes inflammation in your throat. The polio virus releases toxins that destroy nerve cells (often leading to paralysis). Some bacteria are benign or beneficial (for example, we all have millions of bacteria in our intestines and they help digest food), but many are harmful once they get into the body or the bloodstream.

Viral and bacterial infections are by far the most common causes of illness for most people. They cause things like colds, influenza, measles, mumps, malaria, AIDS and so on.

The job of your immune system is to protect your body from these infections. The immune system protects you in three different ways:

1. It creates a barrier that prevents bacteria and viruses from entering your body.
2. If a bacteria or virus does get into the body, the immune system tries to detect and eliminate it before it can make itself at home and reproduce.
3. If the virus or bacteria is able to reproduce and start causing problems, your immune system is in charge of eliminating it.

The immune system also has several other important jobs. For example, your immune system can detect cancer in early stages and eliminate it in many cases.

